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For: An Arbitrary Waveform Synthesizer Using a Free-Running Ring Oscillator

ABSTRACT

The waveform generator includes a free-running ring oscillator, an algebra module, a
5 switching module and an output module. The free-running ring oscillator includes a plurality of
delay elements connected in a loop and a plurality of taps disposed between the delay elements,
with each tap providing a uniquely phased, oscillating transition signal. The algebra module
generates an output signal indicating a first rising edge of the arbitrary waveform in response to
an input signal. The switching module includes a switch input port in electrical communication
10 with the algebra data output port, a plurality of switch tap input ports in electrical communication
with the free-running ring oscillator taps and switch output port. At the switch output port, the
switch module provides a first transition signal selected from one of the plurality of free-running
ring oscillator taps in response to the signal indicative of a first rising edge received at the switch
input port. The output module has a transition signal input port in electrical communication with
15 the switch output port, a window input port in electrical communication with the algebra data
output port and a waveform output port in electrical communication with the clock input port of
the algebra module. The output module creates an arbitrary waveform at the waveform output
port in response to the first transition signal received at the transition signal input port of the
output module and the signal of a first rising edge received at the window input port.

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